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1: J Neurosurg. 1998 Nov;89(5):748-54.

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Oxidative stress in the human brain after subarachnoid hemorrhage.

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OBJECT: The aim of this study was to verify the patterns of antioxidant enzymatic activity of superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px) in the human brain after subarachnoid hemorrhage (SAH) to verify whether an "oxidative stress situation" characterizes the brain response to subarachnoid bleeding. METHODS: Forty samples of gyrus rectus or temporal operculum that were obtained during a surgical approach to anterior circulation aneurysms were used for this study. The activity of total SOD, GSH-Px, and the SOD/GSH/Px ratio (which expresses the balance between the production of hydrogen peroxides by dismutation of superoxide radicals and the scavenging potential) were calculated in each case. Twelve samples were obtained from patients who underwent surgery for unruptured aneurysms (control group); 13 samples were obtained during surgical procedures performed within 72 hours of SAH; and 15 samples were obtained during delayed surgical procedures (> 10 days post-SAH). Ten patients presented with clinical deterioration caused by arterial vasospasm. In both SAH groups, the mean total SOD activity was significantly higher than in the control group (p=0.029). The mean activity of GSH-Px did not differ significantly between the SAH and control groups (p=0.731). There was a significant increase in the SOD/GSH-Px ratio in both SAH groups, as compared with controls (p < 0.05). There was a significant correlation between the enzymatic activity and the clinical severity of the hemorrhage, with findings of lower values of SOD and, mainly, of the SOD/GSH-Px ratio in the poor-grade patients. The SOD/GSH-Px ratio was 2.14+/-0.44 in patients who presented with clinical vasospasm and 1.24+/-0.2 in cases without vasospasm. CONCLUSIONS: The results of this study show an imbalance of the antioxidant enzymatic activities in the human brain after SAH. which is linked to the severity of the initial bleeding and possibly modified by the development of arterial vasospasm.

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